

## SCIENCE DEPARTMENT

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### Science 6: Earth Science

Year

6

Sixth-grade science is the systematic study of the Earth and how it works. During the first semester, students focus on space science, focusing on the Earth, Sun, and Moon's relationships. In the second semester, students study water resources and earth science, including the Earth's history and how the Earth functions. Weekly labs are used throughout the year. iPads are integrated with the curriculum in order to provide access to online materials through Think Central. Other apps, such as Google Earth, are used frequently to help students visualize geologic concepts.

### Science 7: Life Science

Year

7

The seventh-grade Life Science course examines the wonders of God expressed through His creation. Hands-on laboratory activities and collaborative work emphasize a more complex understanding of change, cycles, patterns, and relationships in the living world. Students build on basic principles related to these concepts by exploring structure and function from cells to body systems; the dynamic relationships among organisms, populations, communities and ecosystems; and the change of populations as a result of the transmission of genetic information from generation to generation. By completing labs throughout the year, students' explanations of nature are developed and tested using observation, experimentation, models, and critical thinking. Science and engineering practices at this level include manipulation of variables in experiments, analyzing and interpreting data, and drawing evidence from multiple sources to support a claim.

### Science 8: Physical Science

Year

8

Physical Science is the study of the non-living components of the natural world. Throughout the year, students will study topics surrounding matter and energy and the changes that they undergo. The course begins with a general exploration of matter and energy, including structure and states of matter, physical and chemical changes, types of energy, and the law of conservation of mass and energy. The remainder of the first semester takes a closer look at matter on a molecular level by introducing such topics as the periodic table, chemical bonding and reactions, and types of solutions. In the second semester, the course returns to look more closely at energy related to motion, work and power, electricity, and sound and light. For each of these topics, students will be exposed to the associated real-world technologies that are pushing the scientific boundaries of the modern age. Weekly practical laboratory sessions will be used to reinforce scientific concepts and truly engage the students. Through both the scope of content covered in class, and the regular hands-on investigation of scientific principles, students will practice independent learning and develop the necessary laboratory and data collection skills for high school science.

### Biology \*

Year

9-12

Biology is one of the fundamental science courses that all high school students must take. Biology focuses on the large and small workings of living things as well as the actual practice of investigating those processes through labs. The course begins with a unit on scientific practices as students learn best practices of lab work. It then requires students to apply those lab practices to our major units on ecology, stewardship, cell biology, energy flow, inheritance of traits, and evolutionary theory. A large portion of this class focuses on applying what students are learning to lab work which involves designing experiments, carrying them out, and making predictions. Students will get extensive exposure to science practices in labs that will prepare them for successful laboratory work in the rest of their high school science courses.

\* Course meets UC eligibility

All course offerings are subject to minimum enrollment levels.

## SCIENCE DEPARTMENT (CONT'D)

**Biology Honors \* ^** **Year** **9-12**  
Biology is one of the fundamental science courses that all high school students must take. Biology focuses on the large and small workings of living things as well as the actual practice of investigating those processes through labs. The course begins with a unit on scientific practices as students learn best practices of lab work. It then requires students to apply those lab practices to our major units on ecology, stewardship, cell biology, energy flow, inheritance of traits, and evolutionary theory. A large portion of this class focuses on applying what students are learning to lab work, which involves designing experiments, carrying them out, and making predictions. Students will get extensive exposure to science practices in labs that will prepare them for successful laboratory work in the rest of their high school science courses. While the content of Honors and Regular Biology are similar, there will be a greater emphasis in the Honors course placed upon developing higher-level thinking skills, such as synthesis and application, which will be assessed on exams and in other written assignments.  
**Prerequisite:** Completion of Science 8 with an A- or higher.

**Physical Science \*** **Year** **10**  
Physical Science is designed to provide a conceptual framework for advanced study in Chemistry and Physics. The course will focus on the concepts underlying the structure and behavior of matter (Chemistry) and the laws governing energy and its behavior (Physics). Physical Science is designed as a standard laboratory class with experiments and formal reports as an integral part of the coursework.

*Students entering 10<sup>th</sup> grade who have earned a B or higher in both Biology and Algebra 1, and are currently enrolled in Algebra 2, may choose to bypass Physical Science and take Chemistry. The Physical Science course covers vital concepts that will be used by students in Physics and Chemistry.*

**Chemistry \*** **Year** **10-12**  
This course covers such topics as the structure of matter, nomenclature, electronic structure, periodicity, intermolecular forces and an in-depth mathematical treatment of thermodynamics, kinetics, equilibrium, stoichiometry, acids and bases and redox chemistry. This course is geared to prepare students for success in college-level chemistry. Labs cover classic experiments in each major topic. Students must be competent in Algebra 1 prior to entering chemistry, as the course requires a strong foundation in algebraic manipulation.  
**Prerequisites:** Completion of Biology or Biology Honors with a B or higher, completion of Algebra 1 with a B or higher and concurrent enrollment in Algebra 2 or higher.

**Chemistry Honors \* ^** **Year** **10-12**  
This course involves a more in-depth and mathematically rigorous treatment of the subjects covered in regular chemistry and includes detailed coverage of molecular structure and topics in applied chemistry.  
**Prerequisites:** Completion of Biology with an A- or higher, or Biology Honors with a B+ or higher, completion of Algebra 1 with an A- or higher, and concurrent enrollment in Algebra 2 or higher.

**AP Chemistry \* ^** **Year** **11-12**  
The purpose of the AP Chemistry course is to expose students to a college-level chemistry course. The course will build on material from the first year of chemistry, emphasizing extensive lab work and discussion of advanced topics in chemistry. Evaluation of student performance will be through chapter exams and formal lab reports accompanying laboratory assignments. The course follows the College Board recommended curriculum.  
**Prerequisites:** Completion of Chemistry with an A- or higher, or Chemistry Honors with a B or higher, and AP Committee approval.

\* Course meets UC eligibility  
^ Earns an extra grade point

All course offerings are subject to minimum enrollment levels.

## SCIENCE DEPARTMENT (CONT'D)

**AP Biology \* ^** **Year** **11-12**  
AP Biology is designed to be the equivalent of an introductory college biology course and is extensively based on chemistry. AP Biology provides a comprehensive study of cell and molecular biology, in addition to ecology, human systems, and modern evolutionary biology. The course demands time and effort well beyond that of a typical high school course (including lunchtime and after-school laboratory sessions). The course follows the College Board recommended curriculum.  
**Prerequisites:** Completion of Biology with an A- or higher, or completion of Biology Honors with a B+ or higher, completion of Chemistry, and AP Committee approval.

**Environmental Science \*** **Year** **11-12**  
Environmental Science is a full-year laboratory and field science course designed to introduce students to scientific principles and methodologies needed to understand the interrelationships of the natural world, to analyze environmental problems, and to examine solutions for resolving or preventing them. The field of environmental science is interdisciplinary, and students will grapple with a wide variety of topics from biology, chemistry, geology and social sciences. Emphasis is given to data analysis, critical thinking, and laboratory and field investigation skills. Students will also engage with Bay Area agencies and non-profit organizations working in soil and water quality, water resources management, habitat restoration, endangered species recovery, and other local environmental issues.  
**Prerequisites:** Completion of Biology and completion of Chemistry or Physical Science.

**AP Environmental Science \* ^** **Year** **11-12**  
AP Environmental Science is a full-year, college-level laboratory and field science course designed to investigate ecological relationships, analyze environmental problems and conduct research about possible solutions. Within the interdisciplinary field of environmental science, students will grapple with a wide variety of topics from biology, chemistry, geology and social sciences. Students will conduct individual research and gain experience in data analysis, critical thinking, laboratory and field investigation skills. Students will also engage with Bay Area agencies and non-profit organizations working in soil and water quality, water resources management, habitat restoration, endangered species recovery, and other local environmental issues. This college-level course follows the College Board recommended curriculum.  
**Prerequisites:** Completion of Biology and Chemistry with a B or higher or completion of Biology Honors and Chemistry Honors with a B- or higher, and AP Committee approval.

**Physics \*** **Year** **11-12**  
Physics is a non-calculus based, college-preparatory class in the physical sciences. It covers classical Newtonian mechanics, the definition of work, energy and power, thermodynamics, and applications of these definitions to mechanical, chemical, and electromagnetic systems. The class consists of lectures, problem-solving sessions, and laboratory activities. Students must be able to think critically, work problems, and have high proficiency involving algebra, plane geometry, and trigonometric relations. Experience with vectors is recommended but not required.  
**Prerequisites:** Concurrent enrollment in Pre-Calculus or Pre-Calculus Honors. Completion of Chemistry with a B or higher or Chemistry Honors with a B- or higher.

\* Course meets UC eligibility  
^ Earns an extra grade point

All course offerings are subject to minimum enrollment levels.

## SCIENCE DEPARTMENT (CONT'D)

### AP Physics 1 \* ^

Year

11-12

This course is intended to cover the first semester of college-level study in algebra-based physics. Students explore principles of Newtonian mechanics (including rotational motion); work, energy, and power; mechanical waves and sound; and introductory, simple circuits. Students will need to be highly proficient in algebraic manipulation, including graphing and trigonometry. This is an inquiry-driven course where students will develop an understanding of concepts in physics through experimentation and data analysis rather than the traditional lecture format. Students will spend approximately 25%-50% of class time in the laboratory doing traditional experiments as well as designing and executing their own experiments as part of learning how to apply course material to solve problems with minimal guidance. Assessment will be based on College Board problems split equally between problem solving and experimental design/explanatory essay questions.

**Prerequisites:** Concurrent enrollment in Pre-Calculus or Pre-Calculus Honors. Completion of Chemistry with an A- or higher, or Chemistry Honors with a B+ or higher. AP Committee approval required.

### Anatomy and Physiology \*

Year

11-12

The Anatomy and Physiology class is designed to give juniors and seniors a look at God's most fascinating creation, the human body. The course is designed to cover many areas including: anatomy – the study of form or structure of body parts and how these relate to one another; physiology – the study of the functioning of the body's structural machinery, how the parts of the body work and carry out their life-sustaining activities; emerging discoveries in genetic engineering; techniques for detecting and treating disease; and ways to stay healthy. In addition to classroom lectures and discussions, the course will rely on laboratory dissections to view anatomical structures and outside trips to hospitals and laboratories to gain practical physiological analyses.

**Prerequisites:** Completion of Biology and completion of Chemistry or Physical Science.

## SCIENCE ELECTIVES

### Pestilence and Civilization \*

Year/Semester

11-12

This course is designed as an interdisciplinary study of infectious disease and the impact it has had on the development of cultural, medical, and social traditions throughout history. The first semester of the course will focus on the biology of infectious disease (microbiology, immunology, and the theory and practice of epidemiology), and on two major diseases of ancient times: bubonic plague and smallpox. The second semester will focus on vaccination theory and diseases of modern times: influenza, tuberculosis, malaria and yellow fever, polio, and AIDS, as well as the current status of emerging infectious diseases. This course is structured in a discussion format and emphasis will be on reading of material from textbooks along with current periodicals and publications from the CDC and the WHO. Assessment will be by means of classroom participation, written responses to assigned reading, and in-class projects. Priority will be given to those students who sign up for a full year, although the course may be taken for a single semester.

**Prerequisite:** Completion of Biology.

\* Course meets UC eligibility

^ Earns an extra grade point

All course offerings are subject to minimum enrollment levels.